Moisture Transport and Fresh Water Flux Over Oceans

Dr. Wenqing TANG and W. Timothy LIU
Jet Propulsion Laboratory, California Institute of Technology
M.S. 300-323, 4800 Oak Grove Dr.
Pasadena, CA 91109, U.S.A.
Tel.: +1-818-354-8199; Fax: +1-818-393-6720
Email: wqt@pacific.jpl.nasa.gov
Corresponding and presenting author: Wenqing Tang
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Under stationary conditions, ocean surface fresh water flux, which is the difference between precipitaiton (P) and evaporation (E), is balanced by the devergence of column-integrated moisture tansport (IMT) in the atmosphere. The balance affects the global hydrologic balance and goverms the thermohaline circulation in the oceans. The computation of the IMT requires vertcial profiles of wind vector and specific humidity, which traditionally come from rawindsondes. Over the ocean, rawindsondes are sparse. Spacebased scatterometer can measure wind vectors at the surface of the ocean (SWV) and the microwave radiometers can measure the column-integrated water vapor (IWV). This study is intended to demonstrate that the two spacebased measurements can contribute to estimation of IMT and, therefore, the monitoring and study of the variability of global hydrologic balance and P-E.

IMT can be written as the product of IWV and an equivalent velocity (EV). EV is the depth-averaged wind velocity weighted by humidity. One year of wind and humidity profile from the reanalysis of the European Center for Medium Weather Forecast are used to compute EV. The EV computed exhibit close relation to SWV. Both statistical and physical model relating EV to SWV are being developed and tested. Maps of P-E over tropical oceans computed for scatterometer and radiometer data using the models are found to be in agreement with P-E climatologies compiled from ship reports and directly estimated from spacebased data.